their character and reconstructed their history. He had early struggles and difficulties which sometimes made him seem a little austere, but as time went on his innate kindness asserted itself more and more, and his death will be deeply mourned, not only by those who benefited from his professional skill and knowledge, but by many who had experienced generous kindness at his hands.

NOTES.

AMONG the numerous portraits exhibited at the Royal Academy this year three may be specially mentioned. That of Sir Archibald Geikie, painted by Mr. R. G. Eves for presentation to the Royal Society, is a successful and welcome addition to the series of portraits of past-presidents of the society. The Hon. John Collier's portrait of Mr. C. V. Boys is not only excellent in itself, but also noteworthy for the skilful treatment of an experiment in thin films. A portrait of Dr. E. A. Wilson by Mr. H. G. Riviere, destined for Cheltenham College, is of melancholy interest as an appropriate memorial to the naturalist of the National Antarctic Expedition. A striking oil painting by Mr. John Cooke, forms a memento of a discussion on the Piltdown skull which was held in the conservator's room at the Royal College of Surgeons in June, 1913. Prof. Arthur Keith sits at a table covered with the remains of the skull, restored models, and specimens for comparison, while Prof. Elliot Smith stands behind on his right pointing to the disputed middle line of the cranium. Mr. Charles Dawson and Dr. Smith Woodward also stand behind on his left, and Sir Ray Lankester sits at the end of the table beneath them. Prof. A. S. Underwood and Mr. W. P. Pycraft are seated, one on either side of Prof. Keith, and the modeller of the restorations, Mr. F. O. Barlow, stands behind Prof. Smith. All the portraits are excellent, and the composition of the group is pleasing.

PROF. E. W. MARCHANT, of the University of Liverpool, has been elected chairman of the Liverpool Engineering Society for the coming year.

WE learn from the *Lancet* that Prof. R. Newstead, of the Liverpool School of Tropical Medicine, is in France, prosecuting entomological investigations from the point of view of military sanitation.

THE Pereira medal of the Pharmaceutical Society has been awarded to Miss Dora F. White, and the silver and bronze medals of the society to Mr. A. J. Somer and Mr. R. W. Bowles respectively.

WE learn from *Science* that the Draper medal was presented to Dr. Joel Stebbins, professor of astronomy at the University of Illinois, at the annual dinner of the National Academy of Sciences, held on April 20.

MR. T. R. GREENOUGH and his mother have given, in memory of the late Alderman T. Greenough, a complete electrical and radiographic installation to the Leigh Infirmary. It is in three divisions, and its value is estimated at about 5000*l.*

THE Swarthmore lecture of the Society of Friends for the present year will be delivered at the Central Hall, Westminster, on Tuesday next, May 18, at 7.30 p.m., by Prof. Silvanus P. Thompson, who will speak on "The Quest for Truth." There will be no charge made for admission.

IN *Egyptian Illustration* for May Mr. W. G. Kemp announces his discovery of a partially fossilised human skull and associated remains in a cavern in the limestone of the Mokattam Hills, near Cairo. The specimens, which are considered to be prehistoric, are now being studied by Dr. Ferguson at the Cairo School of Medicine.

MR. G. MASSEE has retired from his position as head of the cryptogamic department in the herbarium at the Royal Botanic Gardens, Kew. Mr. Massee joined the Kew staff in 1893, in succession to Dr. M. C. Cooke, and he has rendered valuable service to agriculturists and horticulturists throughout the British Empire in all questions concerning plant pathology.

WE regret to learn of the death of Prof. Erich Harnack, director of the pharmacological institute of the University of Halle, and a brother of the well-known Adolf Harnack. The deceased, a native of the Baltic provinces, was a pupil of Schmiedeberg, in conjunction with whom he prepared, from choline, so-called synthetic muscarine, at one time believed to be identical with the poison of *Amanita muscaria.*

WE learn from the *Irish Naturalist* that the following naturalists in Ireland are among those who have been given commissions in the Army in connection with the present call to national service:—Prof. Gregg Wilson, professor of zoology, and Dr. A. R. Dwerryhouse, lecturer in geology, Queen's University, Belfast; Prof. H. A. Cummins, professor of botany and agriculture, University College, Cork; Mr. C. M. Selbie, of the National Museum, Dublin; Mr. G. P. Farran and Mr. A. B. Hillas, of the Fisheries Office; Mr. H. T. Kennedy and Mr. R. L. Valentine, of the Geological Survey.

THE *Pioneer Mail* for April 16 states that in spite of delays due to the European war, Sir Leonard Rogers's scheme for establishing a School of Tropical Medicine in Calcutta is progressing satisfactorily, and the time when the building will be ready for use is well in sight. The aim of the institution is to investigate specially the cause of tropical diseases and render the best possible relief on practical lines with the view of finding more accurate methods of diagnosis and improved treatment. The fund for building a hospital for tropical diseases now amounts to about 14,000*l.* (paid up), including a recent anonymous donation of 2700*l.* through Dr. K. C. Bose. Plans for the hospital are nearly ready, and the building is expected to be commenced very shortly.

THE third Wilbur Wright Memorial Lecture of the Aeronautical Society will be delivered by Prof. G. H. Bryan, on May 20, at the Royal Society of Arts, John Street, Adelphi. Gold medals of the society, awarded respectively to Prof. Bryan and to the late Mr. E. T. Busk, will be officially presented immediately before the lecture. The late Mr. Busk played a unique part in the extension to full-sized aeroplanes of the theoretical methods of calculating aeroplane stability due to Prof. Bryan, and lost his life by fire in the air while carrying out his experiments. Machines designed by the methods thus evolved form a large proportion of the valuable aerial equipment of the Royal Flying Corps. Tickets, of which the number is limited, may be obtained on application to the secretary, Aeronautical Society, 11 Adam Street, Adelphi, W.C.

MR. C. S. MIDDLEMISS, of the India Geological Survey, who was a native of Hull, and many years ago spent much time in investigating the geology of east Yorkshire, has made a valuable addition to the geological section of the Hull Museum. He has presented his entire collection, the specimens being all carefully labelled and catalogued, and most of them refer to east Yorkshire. Some years ago Mr. Middlemiss had an opportunity of examining the interesting sections in the Kellaways Rock at South Cave, which were made during the construction of the Hull and Barnsley Railway, and were described in the *Geological Magazine* at the time. The South Cave specimens, together with many others from the red and white chalk, etc., are included, and in addition there is a valuable series of rocks, with a catalogue giving full localities, etc. There is no doubt that Mr. Middlemiss's collection will be of great service to local geologists.

THE British Fire Prevention Committee has done much useful war emergency work during the last nine months. The general honorary secretary, Mr. Ellis Marsland, has issued a statement which shows that the committee's special fire survey force of honorary surveyors has surveyed in detail about five hundred establishments taken over for war emergency work. The character and extent of these establishments varied, but often included extensive groups of buildings. The committee's warning service embraces the preparation and issue of public fire warnings disseminated in the form of posters, or as notices reproduced by technical societies, etc. More than 25,000 posters were issued to auxiliary hospitals at home, in France, in the Mediterranean, and in Egypt, as well as translations in French, Flemish, Urdu, and Panjabi. Refugees' homes and hostels in four hundred localities received about 22,000 warnings in English, French, and Flemish. The issue of farmers' warnings in connection with the epidemic of farm fires last autumn totalled more than 30,000. The number of warnings issued for premises occupied by troops exceeded 25,000. The committee's special fire service force, comprising ex-fire brigade officers and firemen, has rendered two hundred firemen with the necessary appliances readily available for mobilisation in sections within forty-eight hours. Fuller particulars of the various activities of the committee may be obtained from the office at 8 Waterloo Place, Pall Mall, London, S.W.

BRITISH zoology has suffered a distressing loss in the death of Mr. Charles H. Martin, of Abergavenny, who was killed in action on May 3, in the western battle front of the Allies, at the age of thirty-three. Mr. Martin was educated at Eton and Magdalen College, Oxford, took honours in zoology at Oxford, and devoted himself with enthusiasm to zoological research. He worked chiefly, and in recent times almost entirely, at Protozoa, and published important investigations on Acinetaria, on Trypanoplasma and allied forms, and on the cæcal parasites of fowls. Latterly he devoted himself to the study of the Protozoa of the soil, working in touch with the Rothamsted Experimental Station, and published valuable contributions to this subject, either alone or in collaboration with Mr. K. R. Lewin, of the Rothamsted Station. He was awarded the Rolleston memorial prize for his researches. For a time he was in charge of Messrs. Gurneys' laboratory at Sutton Broad, Norfolk, and afterwards assistant in the natural history department of the University of Glasgow for three years, but on his father's death he succeeded to his estate, and gave up all appointments. He continued, however, to pursue his zoological investigations with characteristic energy, in spite of the many distractions and occupations incidental to the life of a sportsman and a conscientious country squire, often carrying on researches at night after a strenuous and fatiguing day. A man of splendid physique, he joined the Officers Training Corps early in his career, and obtained a commission in the 3rd Monmouthshire (Territorial) Regiment, of which he was an officer when he met his death. Possessed of great personal charm and of a most kindly, sincere, and generous temperament, his untimely but glorious death will be greatly deplored by all who had the privilege of being acquained with him personally, as well as by those who knew him only as one of the most promising of our younger zoologists.

IN the Journal of the Royal Anthropological Institute for July–December, 1914, the Hon. John Abercromby discusses a large collection of pottery from the Canary Islands and the bearing of it upon the origin of the people inhabiting the archipelago. He arrives at the following conclusions. The archipelago was first colonised in the second, or Berber, stage of the Neolithic period by a people who spoke a Berber dialect. These colonists probably belonged to the short dolicho- and meso-cephalic stock of Hamitic type, or to the tall Cro-Magnon type. Both were of African origin, and may have arrived together or at short intervals. The short-headed people were presumably of European origin, but archæological considerations show that they may have reached the archipelago about the same time as the other two elements in the population, at any rate before the art of navigation had ceased to be known.

IN a reprint from the Proceedings of the United States National Museum for April last, Mr. Oliver Hay describes remains of two extinct horses, a bison, and a musk ox, also extinct, and new to science, from the Pleistocene of North America. The author believes that it will be necessary to recognise at least two distinct species among the progenitors of our domesticated horses. One of the two supposed species is represented to-day by the large, narrowfaced horses; the other by the pony-like, broad-faced horses, especially the Celtic pony and the fjord horses of Norway.

AN interesting summary of the "Natural History of the Whale-shark" (*Rhineodon typica*), by Prof. E. W. Gudger, is given in the March number of *Zoologica,* the organ of the New York Zoological Society. Little is known of this fish, the largest of the sharks, and estimates of its length vary immensely, but it would seem that its maximum length is about 45 ft. Prof. Gudger's summary is based upon a specimen captured at Miami, Florida, during June, 1912. Unfortunately, however, he is able to write at first hand only of the stuffed skin of this fish, for the rest he has had to rely on photographs, and the account of Capt. Thompson, who harpooned it. He nevertheless brings together some valuable notes on its coloration, habits, and food, compiled from various sources.

IN "Notes on the Evidences of Age Afforded by the Growth Rings of Oyster Shells" (Fisheries, Ireland, Scientific Investigations, 1913, ii. [1914]), Miss A. L. Massy gives particulars of measurements and of the number of surface lamellæ of the shells of more than 600 oysters of known age and of various ages from eighteen months to six years. Summing up her observations as to the relation between age and the number of surface lamellæ, or growth rings, Miss Massy states that an oyster of eighteen months or two summers appears to possess at least two rings, but may have as many as five; one of three summers has at least two rings, but may have six. A four-year-old oyster may have only three rings, or may possess seven or eight. It would have added greatly to the interest of the paper if these surface rings had been compared with the number of rings shown in sections of the shell.

PUBLICATION DE CIRCONSTANCE, No. 69, of the International Council for the Study of the Sea is entitled "A Contribution to the Biology of the Mackerel: Investigations in Swedish Waters," by David Nilsson. The subjects dealt with are the relation of length to weight in the mackerel, age and growth, food, parasites, sex and maturity, eggs and larvæ, and variation. The material examined, which was collected off the west coast of Sweden, was unfortunately not very large; indeed, scarcely sufficient to justify many of the conclusions which the author attempts to draw from it. On the question of age and growth both the scales and the otoliths have been examined. In the mackerel, however, the appearances seen on both of these are very difficult of interpretation, and the figures given in the paper, which are reproductions (perhaps not very good ones) of photographs, are not very convincing. The author considers that mackerel of 120 to 210 mm. long in August, September, and October are derived from eggs spawned in the same year, although he shows that spawning in Swedish waters takes place principally in July. Much further research on a far more extensive scale is required before our knowledge of the life-history of the mackerel can be regarded as adequate and trustworthy.

IN his report on the survey operations for the year 1913–14 (New Zealand Department of Lands and Survey) Mr. E. H. Wilmot, who has recently taken up the duties of Surveyor-General, sets forth the work of the year and shows the steady progress which has been made. Work on the second-order triangulation seems to have been mainly preparatory for future field work, and to include the computation of observations previously made. The magnetographs at the observatory were kept continuously in operation, and the discussion of the field observations of the magnetic survey is well advanced. The observatory also cooperated with the staff of Captain Scott's Antarctic Expedition in pendulum observations, determination of times, transmission of time signals, etc., rendering thereby much valuable assistance to the expedition. An appendix treats briefly of the measurement of the Kaingaroa base, about 11·5 miles in length, for the second-order triangulation. The probable error of the measurements is small, but a complete discussion of the base and its relation to others in the network cannot yet be given.

THE two sections of *Science Abstracts* issued April 26 do not show any marked decrease in the number of scientific papers with which the publication has to deal in the interval between two issues. The Physics Section extends to forty-eight and the Engineering Section to forty pages. We notice in the former abstracts from the autumn and winter numbers of the *Annalen der Physik,* but there is nothing in the Engineering Section to correspond.

THE *Scientific American* for April 17 describes the American form of the metal-spraying "pistol" invented by a Swiss engineer, Mr. Schoop. A thin metal wire is fed at a suitable speed through the tube of a Bunsen burner into the flame, in which it is melted. At this point it is subjected to a rapid blast of air which blows it out of the mouth of the Bunsen in a stream of extremely fine particles. The apparatus is held in the hand very much like a pistol, and the jet may be directed on to any object which it is desired to cover with a thin film of the projected metal. The spray does not appear to damage the object on which it is deposited, and brass has been deposited on silk without its texture being injured.

THE "Appeal to Non-Producing Mathematicians," recently published by Mr. Paaswell in the Bulletin of the American Mathematical Society, and noted in NATURE, January 14, 1915 (vol. xciv., p. 541), has received a reply from Prof. C. N. Haskins in the April number of the Bulletin (vol. xxi., No. 7, p. 343). It will be remembered that Mr. Paaswell directed attention to certain outstanding mathematical problems of engineering, and comment was made in these columns on his omission of reference to aeroplane investigations. It would seem, from Prof. Haskins's comments, that engineers do not find it possible to add to their qualifications the training necessary to cope with such problems, and he suggests the desirability of mathematicians adding the necessary engineering to their mathematics. Unfortunately, however, when mathematical honourmen turn to engineering, they cease to go further in mathematics, as they find it pays better to qualify as engineers. The average mathematician who is not essentially by nature and genius devoted to pure mathematics, finds that it is more to his advantage, and is a far less arduous task, to qualify in physics, chemistry, or engineering, where he may find an outlet for his energies outside the teaching profession. Problems of the class contemplated by Mr. Paaswell depend essentially on a knowledge not so much of engineering as of *applied mathematics,* such as rigid dynamics, hydrodynamics, thermodynamics and conduction of heat, and elasticity, up to the standard of the old part ii. tripos, which is a less attractive sequel to part i. than the engineering tripos. Consequently applied mathematicians proper are few and far between, and a certain class of problems possessing no inherent difficulties is running to waste. Moreover, the few specialists interested in such work can only undertake it in the intervals between professional duties, often occupied with the teaching of engineering students of a very elementary standard.

Messrs. Dickinson and Osborne, of the U.S. Bureau of Standards describe in the April issue of the Journal of the Franklin Institute what they term an "aneroid calorimeter." It is an instrument in which equalisation of temperature is secured by means of the thermal conductivity of copper instead of by the convection of a stirred liquid. The calorimeter described, which consists of a thick walled cylindrical vessel of copper in the walls of which are embedded a coil of resistance wire to supply heat electrically, and a platinum resistance coil for use as a thermometer, has been found useful over a wide range of temperatures, and is applicable to a variety of problems. For use at low temperatures the calorimeter is mounted in a jacket surrounded by a bath of gasoline, the temperature of which can be controlled thermostatically to within a few thousandths of a degree at any temperature between $-55°$ and $+40°$ C., or can be changed rapidly in order to keep it the same as that of the calorimeter when heat is being supplied to the latter. A series of check experiments on the specific heat of water shows the order of reproducibility of results which can be obtained to be 1 part in 2000.

A note on radiation pyrometers and their characteristics, by G. K. Buyers and P. D. Foote has been communicated to the April number of the Journal of the Franklin Institute. It heralds the publication of a very complete paper which is to appear from the Bureau of Standards. Some twenty instruments have been examined, including all the ordinary types commonly met with in practice, such as the four due to Féry, and the Foster, Thwing, and Brown pyrometers. It has been established that the Stefan-Boltzmann law, $E=a(T^4-T_0{}^4)$, is not in general, except by accident, obeyed exactly by any of the pyrometers examined. The similar equation, $E=aT^4.T^{b-4}$ in which b is slightly different from 4 (usually neglecting the T_0 term) is, however, obeyed with sufficient exactness by all total radiation pyrometers. The main factors which influence the value of the exponent b are the geometry and mechanical construction of the instrument; the value of b for twenty thermo-electric pyrometers ranged from about 3·5 to 4·5. The same instrument of the Féry type may have a different exponent according to its use with or without the sectored diagram for increasing the temperature range.

A high-capacity wagon for the South African railways is illustrated in *Engineering* for May 7, together with another wagon of special design and 160,000 lb. capacity, built for transport of whales. These wagons have been constructed by the Leeds Forge Co., Ltd., and are excellent examples of steel rolling-stock. The whale wagon is intended to carry whales over a special 3 ft. 6 in. line a few miles in length from the point where they are brought ashore to the factory, where they are dealt with for the extraction of oil, etc., not far from Durban. The bodies are hauled on to and off the wagon by windlasses. The line is very uneven, and it has been necessary to design the wagon with six-wheeled bogies, so as to keep the axle-loads down to the required limits and ensure the necessary flexibility.

Screw pumps having blades like those of a steamer's propeller, mounted on a horizontal shaft, are a feature of several large pumping installations in the United States, particularly for drainage and flushing work, where large volumes of water must be handled promptly and rapidly. The latest and largest installation of screw pumps is at New Orleans, and is described in the *Engineer* for May 7. This installation is used in removing the storm-water drainage of the city and its surrounding district, lying between the Mississippi River and Lake Pontchartrain. Eleven screw pumps, 12 ft. in diameter, are now being built to supplement the present pumping equipment, so that the total pumping capacity will be 7,240,000,000 U.S. gallons daily. The rapid removal of storm-water by pumping has a marked influence upon the sanitary condition, since it enables the ground to dry out more rapidly, and thus reduces the unhealthy conditions which result from damp and water-soaked ground in a large city. The total annual rainfall in the district ranges from 62 to 75 in., most of the heavy rainfalls being due to severe but brief storms.

OUR ASTRONOMICAL COLUMN.

Meteors from Halley's Comet.—Like the Perseids and Leonids, the meteors connected with Halley's famous comet probably constitute a complete ring. They were first discovered by Lieut.-Col. Tupman while cruising in the Mediterranean in 1870, when the parent comet was near aphelion, and Prof. Alexander Herschel pointed out the significant resemblance between the cometary and meteoric orbits.

This year, in the early mornings of the first week in May, Mrs. Fiammetta Wilson, of Bexley Heath, observed, notwithstanding rather unfavourable weather, several splendid specimens of the Halleyan meteors. Two of these were also recorded by M. Felix de Roy, hon. secretary of the Société Astronomique d' Antwerp, but now resident at Thornton